SECTION 16515

LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-16 Basic Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

A. Extent, location, and details of lighting fixture work are indicated on drawings and in schedules.

B. Types of lighting fixtures in this section include the following:

1. High-intensity-discharge (HID).
   a. Metal-halide.
2. Fluorescent.
3. Incandescent.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions on each type building lighting fixture and component, including ballasts.

B. Shop Drawings: Submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet. Submit details indicating comparability with ceiling grid system.

C. Maintenance Data: Submit maintenance data and parts list for each lighting fixture and accessory; including "trouble-shooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual; in accordance with general requirements of Division 1.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of lighting fixtures of sizes, types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 3 years of successful installation experience on projects with lighting fixture work similar to that required for this project.

C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 220, 410, and 510 as applicable to installation, and construction of building lighting fixtures.

2. NEMA Compliance: Comply with applicable requirements of NEMA Stds Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.

3. IES Compliance: Comply with the following IES publications:

a. RP-15; Illuminance Levels.
b. RP-16; Nomenclature and Definitions for Illuminating Engineering.

4. UL Compliance: Provide lighting fixtures and components which are UL listed and labeled. Comply with the following UL standards:

a. UL 57; Electric Lighting Fixtures.
b. UL 506; Specialty Transformers.
c. UL 486A; Wire Connectors and Soldering Lugs for Use with Copper Conductors.
d. UL 486B; Wire Connectors for use with Aluminum Conductors.
e. UL 542; Lampholders, Starters and Starter Holders for Fluorescent Lamps.
f. UL 935; Fluorescent-Lamp Ballasts.
g. UL 1029; High-Intensity-Discharge Lamp Ballasts.
h. UL 1570; Fluorescent Lighting Fixtures.
i. UL 1571; Incandescent Lighting Fixtures.
j. UL 1572; High-Intensity-Discharge Lighting Fixtures.

5. CBM Labels: Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

B. Store lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle lighting fixtures carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

1.6 SEQUENCING

A. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

Manufacturers shall be per the drawing. Approved equal manufactures will be allowed considering all features, appearance and photometrics are equivalent.

2.2 FIXTURES

A. General: Provide lighting fixtures, of sizes, types and ratings indicated; complete with, but not limited to, housings, energy-efficient lamps, lamp holders, reflectors, energy efficient ballasts, starters and wiring. Ship fixtures factory-assembled, with those components required for a complete installation, including lamps. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated noise. Fixtures shall be post-painted and shall be ordered with lamps pre-installed. Fixtures installed in a grid type ceiling shall include any optional clips or devices designed to meet NEC requirements for attachment or security to grid.

B. Wiring: Provide electrical wiring within fixture suitable for connecting to branch circuit wiring.

C. Fluorescent Lamp Ballasts: Provide electronic fluorescent lamp ballasts, capable of operating lamp types indicated; with high power factor over 90%, rapid-start, Hi frequency + 20 KHZ and Class A low-noise features; Type 1; U.L. Listed Class P. A total harmonic distortion of less than 20%, 1.4 lamp current crest factor, Motorola or equal. Ballast factor must be .875 or higher.

D. High-Intensity-Discharge Lamp Ballasts: Provide HID lamp ballasts, of ratings, types and makes as recommended by lamp manufacturer, which properly mates and matches lamps to electrical supply by providing appropriate voltages and impedances for which lamps are designed. Design ballast to operate lamp within the lamp's power trapezoid requirements. Ballast factor of .85 or greater.

E. Lamps:

1. Provide fluorescent lamps of energy saving types as indicated, with a CRI rating of at least 85 and a Kelvin rating of 3500 unless otherwise specified.

2. Provide phosphor coated metal halide lamps in wattages and chromaticity as indicated. Clear lamps may be used in fixtures with refractors. Lamps of the highest lumen output shall be used.

3. Provide incandescent lamps as required.

F. Support:

1. Install support wires at all four corners of troffer type lighting fixtures and one wire at all others to structure. Support wires shall be of similar type for support of acoustical tile ceilings. Discarded electrical conductors or similar scrape material shall not be utilized for this purpose.

2. Support utility type fixtures with chains or stems attached to a structural steel member.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which lighting fixtures are to be installed, and substrate for supporting lighting fixtures. Notify Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF LIGHTING FIXTURES

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, the latest version of the International Building Code, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Architect. Hangers shall be installed on all four corners and designed to meet BOCA seismic requirements.

C. Install flush mounted fixtures properly to eliminate light leakage between fixture frame and finished surface.

D. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

E. Fasten fixtures securely to indicated structural supports; and ensure that pendant fixtures are plumb and level. Provide individually mounted pendant, fixtures longer than 2 feet with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum one inch vertical adjustment. Mount continuous rows of fixtures with an additional stem hanger greater than number of fixtures in the row.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors,

Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B and the National Electrical Code.

G. Support surface mounted fixtures greater than 2 feet in length at a point in addition to the outlet box fixture stud.

H. The manufacturer's name and catalog numbers referred to are given for identification of type of fixtures desired for locations as indicated on the drawings. Fixtures of other manufacturers, similar in design and equal in operation, efficiency, utilization quality and finish to the various units scheduled may be submitted as substitutes, provided cuts of units, together with all necessary and pertinent photometric and construction data are provided during the submittal phase. Fixtures must be equal in operation, construction, quality and appearance. Exterior fixtures shall be provided with matching poles and shall be substituted by special permission only.

I. Each fixture shall be supplied with the necessary end caps, straps, supports, hangers, canopies, or other miscellaneous materials and devices to install them in a satisfactory manner and to conform to the architectural treatment in the areas in which they are to be installed. The Contractor shall consult all architectural and structural plans, etc., in order that he may familiarize himself with all necessary details for the various units to be installed throughout the project. Failure to do this will not relieve him of furnishing the necessary materials, etc., to perform the function intended for the lighting system as shown on the drawings.

J. The Contractor shall determine and coordinate the proper ceiling mounting apparatus (i.e., grid, flange, etc.) for all lighting fixtures. It shall be the responsibility of the Contractor to modify any and all fixtures as listed in the Fixture Schedule such that the fixtures shall adapt to the ceiling including the use of sloped ceiling adapters or other devices. All fixtures shall be in independently supported apart from the ceiling grid.

K. The contractor shall coordinate exterior pole concrete base anchor bolt layout with construction and installation of bases. If bases indicates are not appropriate for poles as recommended by manufacturer, it shall be brought to the attention of the Engineer. All poles shall be round, non-tapered and constructed of painted aluminum unless otherwise noted.

3.3 FIELD QUALITY CONTROL

A. At Date of Substantial Completion, replace lamps in lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect.

1. Refer to Division-1 sections for the replacement/restoration of lamps in lighting fixtures, where used for temporary lighting prior to Date of Substantial Completion.

B. Furnish stock or replacement lamps amounting to 15%, of each type and size lamp used in each type fixture. Deliver replacement stock as directed to Owner's storage space.

3.4 ADJUSTING AND CLEANING

A. Clean lighting fixtures of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses or parabolic surfaces.

B. Protect installed fixtures from damage during remainder of construction period.

3.5 GROUNDING

A. Provide equipment grounding connections for lighting fixtures and poles as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.6 DEMONSTRATION

A. Upon completion of installation of lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION